REMARKS

Claims 1-4, 6-15, and 17-23 are pending in the application and are at issue.

The "Abstract Of The Disclosure" has been added as required by statute.

Reconsideration of the objection to claims 7-10 under 37 CFR 1.75(c) as being of improper dependent form is respectfully requested.

Independent claim 1 and dependent claims 7-10 have been amended to improve their form. Independent claim 1 further clarifies that the silver alloy composition is comprised of at least 86% by weight silver, and contains copper, zinc, silicon, and germanium each in specifically defined concentration ranges. Dependent claims 7-10 further limit independent claim 1 by adding additional constituents to the silver alloy compositions of independent claim 1. As further elements are added to the composition of claim 1 in dependent Claims 7-10, the original concentration ranges for each element of independent claim 1 remains the same. Applicant believes that the objection to dependent claims 7-10 have been overcome, based on the fact that dependent claims 7-10 further limit the subject matter of independent claim 1, and thus are in proper dependent claim form.

Reconsideration of the rejection of claims 7-10 and 21-23 under 35 U.S.C. §112 second paragraph as being indefinite as respectfully requested.

Dependent claims 7-10 have been amended as described above in order to improve their form and to more clearly define the weight percentages of each additional element added to the silver alloy compositions of independent claim 1. As described above, silver

makes up the bulk, at least 86% by weight of the compositions of both independent claim 1 and dependent claims 7-10. The additional elements defined in dependent claims 7-10 are also recited in definite and specific concentration ranges thus the 112 rejection of claims 7-10 is believed overcome.

Dependent claims 21-23 have also been amended to improve their form. The phrase "further including" objected to by the Examiner has been eliminated. The constituents of claims 21-23 have been more clearly recited, thus the 112 rejection of claims 21-23 is believed overcome.

Reconsideration of the rejection of claims 1-4, 6-15, 17-23 under 35 U.S.C. §103 (a) as being unpatentable over Bernhard et al U. S. Patent No. 5,039,479, in view of Youdelis U.S. Patent No. 4,124,380, is respectfully requested.

Youdelis is not believed to be an appropriate reference under 35 U.S.C. §103, as it is not believed to be an analogous art to the claimed invention. Youdelis is not within the field of applicant's endeavor nor does it attempt to solve the same problems as the claimed invention.

Youdelis teaches a different silver alloy composition used for a different purpose than applicant's claimed invention and thus is not within the field of applicant's endeavor. Youdelis specifically relates to the field of eutectic or near-eutectic silver copper alloys for use in dentistry, as opposed to the field of sterling or near sterling silver alloys used in jewelry making as in the claimed invention.

Eutectic or near eutectic silver copper alloys contain approximately 72 parts of silver to 28 parts of copper by weight, and melt at 780°C, a lower melting point than any

other silver copper alloy compound. Youdelis briefly mentions the extreme ranges of its invention to include silver in up to 85 parts and copper as low as 15 parts by weight. However, the required low melting point and room temperature casting of the alloy of Youdelis, as well as the high copper content needed to maintain the required hardness the alloy must exhibit to be used as fillings, inlays, etc., requires a silver copper alloy weight ratio to correspond to eutectic or near eutectic compositions. Even at the extreme ranges of 85 parts silver and 15 parts copper, the alloy of Youdelis does not contain silver or copper concentrations that overlap the present invention or are within the field of Applicant's endeavor.

The field of Applicant's endeavor relates to sterling silver alloys which must contain at least 92.5 parts of silver to no more than 7.5 parts of copper by weight, as well as near-sterling or fine silver alloys containing no less than 86 parts of silver to no more than 5.5 parts of copper by weight. The silver copper alloy composition of applicant's claimed invention contains a high silver concentration in order to exhibit a desirable silver color suitable for jewelry, flatware, coinage and other fine silver applications. Additionally, the silver alloy of the claimed invention contains a low copper concentration in order to lessen the occurrence of fire staining during the heat treated post-melt processes which are necessary in jewelry making and other fine silver applications.

Applicant also asserts that Youdelis cannot and does not attempt to solve the same problems as the claimed invention. The claimed invention solves the problem of increasing the hardness of sterling or near sterling silver alloys while maintaining a low copper

content, while Youdelis attempts to solve the problem of preserving the high copper content of eutectic or near eutectic silver-copper alloys. Youdelis in dealing with silver alloys rich in copper for use in dentistry, would not logically commend itself to applicant's attention when considering the problems associated with alloys rich in silver and poor in cooper for use in jewelry and other fine silver applications. A person having ordinary skill in the art would not reasonably have been expected to solve the problem of increasing the hardenability of a sterling or near sterling silver alloy for jewelry by considering Youdelis. It is not reasonable to think that all silver alloy problems are analogus, and it is not reasonable to expect a person of ordinary skill seeking to solve the problem of increasing the work hardenability of a sterling or near sterling alloy, to be motivated to look to silver alloys of a much lesser silver concentration combined with a high copper concentration for use in dentistry.

The problems addressed when increasing the work hardenability of a sterling or near sterling silver fire scale resistant alloy revolve mainly around maintaining the desirable silver appearance of the alloy while increasing its hardenability as it is cast, worked, and annealed. The present invention adds trace amounts of germanium to a fire scale resistant silver alloy. The germanium is believed to remain in solid solution during post-melt processes thereby increasing the hardenability of the alloy. Increasing the copper concentration to increase the hardness of an alloy, as is done in Youdelis, cannot be duplicated in a near sterling silver alloy without reducing the silver content in the alloy to a level that would eliminate the sterling or near sterling silver characteristics of the alloy. Significantly increasing the copper concentration in a near sterling silver alloy would also

undesirably increase the fire stain in the alloy as it is heat treated during post melt processes, as is done in jewelry making. Significantly increasing the copper concentration in the present invention as is done in Youdelis would no longer allow the alloy of the present invention to be suitable for jewelry making or other fine silver applications.

Youdelis does not address the problems associated with increasing the work hardenability of high silver low copper content silver copper alloys. On the contrary, Youdelis teaches the addition of germanium in a silver alloy composition in order to chemically reduce the relatively large amount of copper oxide formed in the melt, thus preserving more copper in the melt of the alloy. Youdelis teaches that germanium will act as a sacrificial element and oxidize before copper in order to preserve the relatively high copper concentration in the eutectic or near eutectic silver copper alloy. Youdelis does not teach of using germanium to solve any hardenability problems associated with the post-melt processes of sterling or near sterling silver alloys. In view of the foregoing arguments Youdelis is not believed to be of an analogous art to the claimed invention and thus is an inappropriate reference under 35 U.S.C. § 103.

Independent Claim 1 of the present invention is directed toward a silver alloy composition exhibiting properties characteristic of fine silver alloys and conventional sterling silver. The silver alloy composition of Claim 1 contains at least 86% silver by weight and no more than 5.5% copper by weight. The silver alloy composition of Claim 1 also contains a low concentration of zinc and silicon in a combined amount similar to the copper concentration of Claim 1. The zinc and silicon in the silver alloy of Claim 1 act to deoxidize the silver alloy composition during the melting process, thus increasing the fire

scale resistance of the alloy. Additionally, the claimed invention contains a small amount of germanium which improves the work hardenability of the silver copper alloy during post-melt processes such as casting, hot working or annealing, when the silver alloy composition remains hot after it has been solidified. The trace amount of germanium in the silver alloy composition of the present invention is believed to increase the hardenability of the alloy by remaining in solid solution during post melt hot processes as described above, rather than sacrificially consumed in these processes. Rather than acting as a sacrificed element, preferred over the copper in the alloy and oxidized first to preserve the copper concentration, the germanium is believed to remain in solid solution and not form germanium oxide gas which would invite spawling or void formation in the worked piece of silver alloy. The zinc and silicon of the silver alloy of the claimed invention are instead oxidized in the composition during the melting process rather than the germanium or the small amount of copper in the alloy. The silver alloy composition of the claimed invention is particularly useful for jewelry making due to high silver content, low copper content and its improved work hardening performance over known fire scale resistance silver alloys.

There is no teaching in Bernhard or Youdelis of adding germanium to a sterling or near sterling silver alloy having a low copper concentration. Neither Bernhard nor Youdelis address the unique problems associated with increasing the work hardenability during post melt processing of a near sterling silver alloy having a low copper content and good fire scale resistance, which is required for jewelry making and other fine silver applications.

Bernhard, which was disclosed by applicant to the Examiner, addresses the problems associated with increasing the fire scale resistance in the melt of a silver copper alloy. In Bernhard, there is no suggestion of using germanium in the silver alloy composition. Likewise there is also no suggestion of using germanium in the silver alloy composition to provide for superior work hardenability over other fire scale resistant silver alloys. Additionally, there is no motivation in Bernhard to combine the teachings of Bernhard with the teachings of Youdelis.

Youdelis does not teach a silver copper alloy of at least 86% silver by weight. Youdelis also does not teach a silver copper alloy of no more than 5.5% copper by weight, but rather teaches an alloy that has a very high copper concentration, on average four times higher than the copper concentration in the claimed invention. This high copper content of the Youdelis alloy results in the formation of significant amounts of copper oxide in the melt of the alloy. Youdelis teaches the addition of germanium to its silver alloy to act as a sacrificial element and oxidize before copper in order to preserve the high copper concentration in the eutectic or near eutectic silver copper alloy of Youdelis.

Youdelis does not teach or suggest adding germanium to a silver copper alloy in order to increase the hardness of the alloy or to solve any problems associated with the post-melt processes of silver copper alloys. In fact, Youdelis teaches just the opposite in column 1, lines 62-64, that the "addition of the germanium does not significantly affect toughness or the working ability of the alloy." Youdelis specifically teaches away from the use of germanium in silver copper alloys in order to increase the work hardenability of the alloy. One of ordinary skill in the art of dealing with work hardenability problems

associated with near sterling silver alloys during post-melt processes would not be aware of any similar problems addressed in Youdelis.

The alloy of Youdelis is used in dentistry and is subjected to continual chewing forces in use. It is well known in the art that copper increases the hardness of the resulting alloy, thus the high copper content of Youdelis provides the necessary and sufficient hardness that is required to withstand the application of continual chewing forces in order to use this alloy in fillings, inlays, crowns, etc. There is no motivation in Youdelis to increase the hardness of its silver copper alloy by adding additional constitutents to the alloy, particularly by adding germanium. Adding trace amounts of germanium to a fire scale resistant near-sterling silver alloy as in the claimed invention would not have been obvious to one of ordinary skill in the art at the time of the invention by combining references Bernhard and Youdelis as suggested by the Examiner.

Further, Applicant submits herewith a Declaration under Rule 132 providing further evidence supporting the novelty and non-obviousness of the claimed invention. As seen in Applicant's declaration, United Precious Metal Refining Company, Inc. (United Precious Metal), of Albany, New York, is a significant manufacturer of jewelry grade and other high silver concentration alloys for the jewelry, flatware, fine housewares, and minting industries. United Precious Metal is a corporation which has the means and ability to research and develop improvements for its high silver alloy compositions having increased fire scale resistance, for use in the industries mentioned above. United Precious Metal additionally has the motivation to improve its silver alloy compositions and their suitability for their major markets, particularly for the jewelry industry.

United Precious Metal developed and patented its own sterling silver alloy composition having good fire scale resistance as disclosed in its U. S. Patent No. 5,039,479 (Bernhard et al) filed in September 1990. As early as September 1990, United Precious Metal had developed a near-sterling silver alloy having good fire scale resistance and appearing to be ideal for the jewelry industry but for its soft consistency exhibited during post-melt processes.

At the time of the filing of the Bernhard 479' Patent in September of 1990, the Youdelis Patent had already issued and was published and available in the United States for almost 12 years. United Precious Metal clearly did not look to the Youdelis patent for any teaching in improving the work hardenability of their fire scale resistant silver copper alloys. Additionally, United Precious Metal Refining Company, Inc., though possessing the means and motivation to increase the work hardenability of its fire scale resistant silver alloy, failed to find a solution for years after filing their Bernard 479' patent. In fact fire scale resistant silver alloys had been known in the industry since 1970, and until the present invention, no one added germanium to these high silver content alloys in order to increase their hardenability over other fire scale resistant alloys.

United Precious Metal Refining Company, Inc., chose to license applicant's technology for increasing the work hardenability of fire scale resistant silver/copper alloys. United Precious Metal Refining Company, Inc. licensed the technology of the present invention in 1994, 4 years after it filed its Bernhard 479' patent. It can be assumed that United Precious Metal would not act in a fashion contrary to their economic interest unless convinced of the patentability of the present invention. It could only be concluded that

United Precious Metal Refining Company, Inc., having the means and motivation to develop their fire scale resistant high silver content silver/copper alloy into an alloy with improved work hardenability, and one more suitable for the jewelry industry, certainly found no obvious teachings in the art at the time the present invention was made.

United Precious Metal increased its sale of sterling silver alloys by at least 80% since 1995. The silver alloy compositions of the present invention account for 62% of the sterling silver alloys sold by United Precious Metal so far in 1998. This percentage is up from 36% of the total sterling silver alloys sold by United Precious Metal in 1995, the first full year under the license agreement. United Precious Metal has provided a letter to Apecs dated August 10, 1998, stating that the "introduction of Apecs' developed formula increased the hardness of the silver product and became the preferred metal of choice of United Precious Metal customers." A copy of the above referenced letter is attached to the Declaration Under Rule 132.

The foregoing evidence of the commercial success of the silver alloy compositions of the present invention illuminate the technological and commercial environment of the invention at the time the invention was made, further evidencing the novel and non-obvious combination of the elements of the silver alloy of the present invention. In view of the above arguments, amended claim 1 is believed allowable.

Dependent claims 2-4 and 6-10 ultimately depend from claim 1 and are believed allowable for the same reasons thereof.

The Commissioner is hereby authorized to charge any underpayment or to credit any overpayment regarding this matter to Deposit Account No. 04-2219, referencing our Docket No. C-35469.

Respectfully submitted,

SUSAN M. KEATING
Attorney for Applicant
Attorney Registration No. 41,887

DVORAK & ORUM
53 West Jackson Boulevard
Chicago, Illinois 60604-3606
Telephone: (312) 922-6262
FAX: (312) 922-7747